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The Development and Validation of a Universal Enjoyment Measure: The Enjoy Scale

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The development and validation of a universal enjoyment measure: The enjoy scale

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Abstract

For decades, the concept of enjoyment has been used to measure the psychological benefits of activities and has been shown to determine future behavior toward activities and objects of interest. However, there has been little consensus on the definition and dimensionality of enjoyment. This study introduced a new measure of enjoyment with scale development and validation reported. CFA and EFA findings from 1466 participants across 739 different activities were reported. The instrument developed measured enjoyment across activities, with demonstrated content validity, internal consistency, discriminant and convergent validity. The final 25-item version of the ENJOY scale is composed of 5 factors: pleasure, relatedness, competence, challenge/improvement, and engagement. Discussion of the ENJOY Scale places it within the conceptual framework of Self-Determination Theory.

Keywords Enjoyment · Motivation · Pleasure · Engagement · Scale

Research in psychology often investigates the internal experiences of people as they engage in activities throughout their lives and across domains. It often isn't enough for researchers to know how someone performed on a specific activity, but they also want to know how that person felt about the activity. One variable that reflects the subjective experience of an activity is enjoyment. Upon initial consideration, enjoyment seems like a simple, unidimensional construct; either someone enjoyed an experience or they did not. However, when reviewing the literature related to enjoyment, it becomes evident that enjoyment has been defined and measured in many different ways across many studies.

This study explores enjoyment as a multi-dimensional construct providing theoretical support for a multi-dimensional conceptualization of enjoyment, then describing the process of developing and validating a scale to measure enjoyment using this framework. The resulting scale measures five aspects of enjoyment that can be used across a broad range of different activities.

What is Enjoyment?

Enjoyment is a construct related to quality of life, happiness, positive experiences, or future behavior toward an object or activity of interest. The term enjoyment is often used interchangeably with pleasure (Waterman, 1993). Views on human nature within the philosophy of hedonism equated enjoyment with pleasure, referred to as hedonic enjoyment, and often competed with eudaimonic views (Ryan, et al., 2008). Recently, resulting from the positive psychology movement, a resurgence in literature focusing on positive subjective experiences emerged. In the *Encyclopedia of Positive Psychology,* enjoyment is thought of as engagement in a challenging experience that either includes or results in a positive affective state (Kapsner, 2009).

Journals across disciplines (e.g.,sport and exercise psychology (Wankel, 1985), education systems (Gomez, et al., 2010), entertainment media (Fang, et al., 2010), communication (Tamborini et al., 2011), positive psychology (Deci & Ryan, 2008; Seligman, 2015), and medicine (Wade et al., 2008)) have all published articles underscoring

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the importance of enjoyment to their respective fields of study. However, there are currently multiple definitions of enjoyment, differing across domains, and few attempts have been made to universally define enjoyment. The definitions provided for enjoyment are often too narrow in scope or too similar to other constructs to provide a clear understanding and distinction for reliable and valid measurement.

It is not difficult to see why division exists on the definition of enjoyment as the construct is traced back to its origins. The roots of enjoyment derive from hedonic and eudaimonic views on happiness and well-being within philosophy. Hedonism reflects the view that well-being consists of pleasure or happiness (Kahneman, 1999). Eudaimonism sees well-being as fulfilling or realizing one's daimon or true self (Waterman, 1993). Waterman used the term 'hedonic enjoyment' to describe an experience of happiness, "expected to be felt whenever pleasant affect accompanies the satisfaction of needs, whether physically, intellectually, or socially based" (pp. 679). Waterman sees enjoyment and the experience of happiness as synonymous. It is no surprise then, that enjoyment is considered a key construct in many areas of research and a universal definition is needed to help bridge the work done in various areas (Kapsner, 2009).

Other authors take a motivational and need satisfaction approach to defining enjoyment. In communication research, enjoyment has been defined as the satisfaction of both hedonic and nonhedonic needs (Tamborini et al, 2011), where hedonic needs are defined by arousal and affect, and nonhedonic needs include competence and autonomy. A popular theory in positive psychology, self-determination theory (SDT: Ryan & Deci, 2000, 2001), outlines the eudaimonic (non-hedonic) approach that SDT takes to explain enjoyment and human well-being (Ryan, et al., 2008). In SDT, the pursuit of meaningful goals, done in a choiceful and aware manner, serve to fulfill the basic needs of autonomy, competence, and relatedness, leading to enjoyment and well-being as outcomes of this goal-directed behavior. SDT has been described as a theory of human motivation (Ryan & Deci, 2000), focused on the need to be self-organizing and striving toward positive growth. SDT begins with the premise that there are three basic psychological needs that provide the foundation for motivating human behavior. These needs are autonomy, competence, and relatedness. When conditions support personal autonomy and provide optimal challenge, a state of intrinsic motivation is achieved. Intrinsic motivation is characterized as encompassing positive affect, as well as deep engagement and satisfaction with an activity. Enjoyment is often used to describe the feeling associated with an intrinsically motivated activity. Extrinsic motivation exists when activities lack autonomy (are forced or include origination of the activity outside one's volition) and they are not at an optimal level of challenge (being too hard or too easy). Extrinsically motivated activities, especially at lower levels of self-regulation are reported as less enjoyable.

Self-determination theory also speaks to the universality of enjoyment as an outcome derived from activities that satisfy the three basic psychological needs, or an outcome associated with intricially moticated actions (Ryan & Deci, 2000, 2001). Ryan (2009) discussed the universality of psychological needs, and research has also supported the universality of the three needs across cultures, as well as activity domains (Deci & Ryan, 2014; Milyavskaya & Koestner, 2011; Nalipay et al., 2020). So, while individuals may engage in a wide variety of activities across different cultures, when those activities satisfy their basic psychological needs, enjoyment should result.

Utlizing concepts from positive psychology, Wankel (1993, pp. 153) defined enjoyment as "A positive emotion/positive affective state. It may be homeostatic in nature, resulting from the satisfaction of biological needs (e.g., need to be active), or growth oriented, involving a cognitive dimension focused on the perception of successfully applying one's skills to meet environmental challenges." Based on this definition, enjoyment is domain-specific; researchers have modified it to suit their respective research areas. For instance, within sport and exercise psychology, one definition of enjoyment is the positive affective response to a sport experience that reflects generalized feelings of joy (Scanlan et al., 2016). In business management, enjoyment of work is the degree to which individuals work because they find the activity itself intrinsically interesting or pleasurable (Graves, et al., 2012). For information systems, enjoyment refers to the extent to which the activity of using a computer is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated (Davis, et al., 1992). In education, enjoyment is defined as the extent to which the learning activity is perceived to be pleasant and satisfactory to the learners (Gomez et al., 2010). Generally, AQ3 it seems enjoyment is often seen as a positive outcome, a good feeling that occurs following an activity or interaction with an object. The definitional problem of enjoyment becomes clearer when attempting to distinguish it from other positive outcomes, emotions, affective experiences, or states.

Correlates of Enjoyment

Momentarily setting aside the problems in defining enjoyment, previous research has found the concept to be related to other activities, tasks and cognitions. For instance, enjoyment has a affirmative effect on vigor and energy, and is related to increases in positive affect (Raedeke, 2007). In relation to computer program use, enjoyment correlates positively with attitudes toward technology, usage intentions,

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and actual usage behavior (Davis, et al., 1992; Lee & Tsai, 2010). At work, enjoyment is positively related to career satisfaction, and performance, and negatively related to psychological strain (Graves et al., 2012). Market research also reveals enjoyment is positively related to intentions to return to a shopping website as well as intentions to recommend an entertainment venue (Aykol, et al., 2017; Koufaris, 2002).

Cognitively, expected enjoyment plays a significant role in decision making across cultures, such that many cultures placed more weight on enjoyable activities than useful ones when making hypothetical choices (Falk, et al., 2010). In domains such as exercise, video-gaming, and education, enjoyment was found to be positively related to increases in affective response to activity, predicted future involvement in activity, the perceived value of the activity, and perceived exertion (Raedeke, 2007; Scanlan, et al., 2014; Wankel, 1993; Chen, et al., 2016; Klimmt et al, 2009; Reiger et al., 2014; Ainley, & Ainley, 2011; Berge & Muilenberg, 2005).

Likewise, studies have shown that lack of enjoyment can have deleterious effects on wellbeing. When people forgo activities they enjoy, they reported perceived declines in functioning (Csikszentmihalyi, 1990). With respect to physical health, mortality was found to be inversely associated with the number of occasions on which participants reported high enjoyment of life (Zaninotto, et al., 2016). In summary, enjoyment plays an important role in continued interest, happiness, and engagement beliefs toward activities or objects.

The Present Study

Given the importance of the concept of enjoyment in understanding human behavior, it is problematic that there is no standard definition of enjoyment across domains; consequently, no validated measures of universal enjoyment exist. While enjoyment seems to be intuitively defined and easily measured, science requires empirically based validation. This study seeks to advance our understanding of enjoyment by creating a valid universal measure to support critical studies across domains.

The development of the enjoyment scale closely followed existing guidelines for scale creation and validation using exploratory factor analysis (EFA) followed by confirmatory factor analysis (CFA) (e.g., Cabrera-Nguyen, 2010; DeVellis, 2016; Fry, 1977; Hinkin, 1998; Hinkin et al., 1997; Schwab, 1980). In reviewing the literature on enjoyment, few researchers adopted this practice when measuring enjoyment. Adherence to the best practices of scale development can greatly aid the reliability and validity of a scale, and no domain-spanning scales of enjoyment exist. Thus, there is a need for a psychometrically validated and comprehensive scale of enjoyment that is appropriate across domains.

The present study employed a mixed-methods design in the construction and validation of the new scale consisting of four separate efforts:

1. Item pool generation: New items were created in an attempt to exhaust the enjoyment construct. Items were then selected from previously developed scales and compared to the list of creatively generated items.
2. Expert review of item pool: The item pool was presented to a panel of experts with expertise in enjoyment and/or questionnaire design.
3. Exploratory Factor Analysis (EFA): Statistical analysis was performed to identify the underlying factors and reduce the number of items on the resultant scale.
4. Confirmatory Factor Analysis (CFA): Statistical analysis was performed to validate the scale.

Method and Results

Initial Item Pool Selection

Previous studies including enjoyment (e.g., Nabi & Kremar, 2004; Warner, 1980), engagement (Aykol, et al., 2017; Chen, et al., 2016; Frenzel et al., 2009; Fu, et al., 2009; Koufaris, 2002; Lin et al., 2008; Lyons et al., 2014; Shafer & Carbonara, 2015; Tamborini et al., 2011; Weibel et al., 2008; Wiersma, 2001), flow (e.g., Kimiecik & Harris, 1996; Nakamura & Csikszentmihalyi, 2014; Sherry, 2004; Sweetser & Wyeth, 2005; Wankel, 1993), pleasure (e.g., Davidson, 2000; Kubovy, 1999; Nabi et al., 2004; Nabi et al., 2006; Przybylski, et al., 2014; Tamborini et al., 2011; Wiersma, 2001), and psychological need satisfaction as constructs (e.g.,; Chen, et al., 2016; Davis, et al., 1992; Deci & Ryan, 2014; Fu, et al., 2009; Isikman, 2014; Lee & Tsai, 2010; Lyons et al., 2014; Przybylski, et al., 2014; Reinecke et al., 2012; Ryan & Deci, 2000, 2002; Ryan, et al., 2006; Scanlan & Lewthwaite, 1986; Tamborini et al., 2010, 2011; Wininger, 1999) were used in the creative selection process. Items measuring the above-mentioned constructs were pulled from the studies. Additional scale items were also drawn from existing questionnaires (Agarwal & Karahanna, 2000; Bakker, 2008; Brockmyer et al., 2009; Chou & Ting, 2003; Frederick & Ryan, 1993; Fu, et al., 2009; Hou, 2011; Jackson & Marsh, 1996; Kendzierski & DeCarlo, 1991; Lin et al., 2008; Peterson, et al., 2005; Phan, et al., 2016; Ryan et al., 1997; Rigby & Ryan, 2007; Schaufeli et al., 2002; Sherry et al., 2006; Sørebø, & Hæhre., 2012; Stevens et al., 2000; Watson & Clark, 1994; Wiersma, 2001; Wirth, et al., 2012)) that measured constructs related to enjoyment (e.g., pleasure, engagement, psychological need satisfaction).

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Item Pool Truncation

The item pool (n = 637) was reviewed and refined after the literature item pool had been generated. First, items were screened for redundancy and similar phrasing (e.g."I had total concentration" and "I was deeply concentrated") and reduced to a single item.

Additionally, items which were considered too specific (e.g., "I believe social games are.

playful") or too vague (e.g., "My thoughts go fast") were removed from the pool. Last, items that were deemed as irrelevant to the assessment of enjoyment were also removed (e.g., "I feel bored"). The item pool went through multiple iterations to determine that each item was unique and relevant to enjoyment.

After item pool selection and refinement, 279 of 637 items were removed for redundancy or similar phrasing, and 222 items were removed from the pool for vagueness, specificity, or lack of conceptual relevance. The remaining 136 items were then reviewed by a panel of experts.

Expert Review

Seven experts participated in the expert review. Five had enjoyment and scale/questionnaire expertise. Two were scale/questionnaire experts or experts in a related construct (i.e., Play, Game Satisfaction). All seven experts held a Ph.D. degree in the field of psychology.

Experts were informed that the purpose of their review was to gather their feedback to.

improve the design of the new ENJOY scale. The experts completed an online questionnaire that contained the 136 statements from the generated item pool. The experts were asked to select an activity that they personally engaged in and then responded to each item using a seven-point Likert scale (1 = Strongly disagree, 7 = Strongly agree). For each item, participants were also asked to scrutinize and identify any problematic items in terms of wording, offer suggestions for item improvements, identify items that might not be relevant to enjoyment, andprovide general comments and feedback about the entire scale, including its adequacy at measuring enjoyment. The entire questionnaire took 30–90 min to complete, and all expertss were offered a $30 Amazon gift card upon completion of the survey.

After the expert feedback was analyzed, items that were rated by a majority of raters as having unclear wording, ambiguous meanings or that were too grammatically complex were removed. Tthe item pool was reduced to 125; a total of 11 items were removed from the pool as recommended by the expert raters, and the wording of 24 items was modified for clarity, also based on reviewer recommendations. Remaining items were used in the Exploratory Factor Analysis.

Initial Exploratory Factor Analysis (EFA)

The questionnaire was administered to a general sample to evaluate the factor structure of the instrument. Items were presented in random order. The survey link was shared on popular internet sites (e.g. Reddit.com), a crowdsourcing internet marketplace (i.e., Amazon's Mechanical Turk), and the SONA System at a university in the Southeastern United States. All participants were offered the opportunity to be entered into a raffle with a 10% chance of winning a $30 Amazon gift card. Over a 6-week period, a total of 1483 surveys were collected. During the screening and cleaning process, 46.2% (n = 685) of the surveys contained non-valid responses. Responses containing incomplete responses, multiple submissions from the same user, short time of completion (2 STD above or below mean completion time) under age 18 (not allowed by the IRB approval), and biased responses (patterns where participants selected the highest or lowest response for every item) were removed from the final data set. Responses were also removed if participants failed to respond correctly to either or both of the two validation questions inserted in the survey. The validation questions instructed the respondents to respond with a specific number to the item.

A total of 798 responses remained for analysis.The final data set was based on a sample of people, between 18 to 74 years of age ($M = 34.71$, $SD = 12.55$). Approximately 60% were females, 68% White, and 90% had at least some college experience. Table 1 provides a summary of the participants' demographics.

Of the 798 activities participants named to evaluate, 374 (46.9%) were unique. The activities evaluated in the EFA study covered a variety of different domains (e.g., Entertainment, Exercise, Food, Sports, Shopping, Jobs). Additionally, most of the activities evaluated were classified as either Entertainment (24.4%), Exercise (19.2%), or Jobs (19/2%).

At the end of the survey participants were asked to rate their level of enjoyment with the activity on a 1–10 slider. Most of the activities evaluated in the EFA study were rated as enjoyable (M = 7.54, SD = 2.29). Participants tended to evaluate activities they "Liked" rather than "Disliked".

EFA Results

Factor Extraction & Rotation An initial EFA was conducted with principal axis factoring as the extraction method, parallel analysis as the truncation method, and promax (kappa = 4) as the rotation method. Extraction utilizing parallel analysis, proposed by Horn (1965), is regarded as one of the best methods for determining the correct factor solution (Henson & Roberts, 2006; Matsunaga, 2010; Russell, 2002; Zygmont & Smith, 2014). Results obtained from the parallel analysis conducted via O'Connor's (2000) SPSS

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Table 1 Demographics of participants in the EFA study

Variable	Value
Total (N)	798
Mean Age in years (SD)	34.71 (12.55)
Gender	
Male	308 (38.6%)
Female	479 (60%)
Other	9 (1.1%)
Ethnicity	
White (not of Hispanic origin)	541 (67.8%)
Black or African American	69 (8.6%)
American Indian or Alaska Native	10 (1.3%)
Hispanic/Latino	51 (6.4%)
Asian or Pacific Islander	120 (15.0%)
Other	3 (0.4%)
I do not wish to answer	4 (0.5%)
Education Level	
Less than high school	5 (0.6%)
High school graduate or GED	78 (9.8%)
Some college	236 (29.6%)
College Graduate (2- and 4-year degree)	343 (43.1%)
Post-graduate degree (MA, PhD, Law, Medical, or Professional school)	135 (17%)

syntax revealed that there were nine underlying factors with eigenvalues above 1.0.

Item Removal Multiple criteria were used for the item removal process. Items which were candidates for deletion consisted of items that: had factor loadings below |.40|, crossloaded on two or more factors with loading values greater than |.32|, had a communality coefficient below 0.30, make little or no contribution to the internal consistency of the scale scores, had low conceptual relevance to a factor, and/or not conceptually consistent with other items loaded on the same factor (Costello & Osborne, 2005; Worthington & Whittaker, 2006; Tabachnick & Fidell, 2013). Each time an item was deleted an EFA and internal reliability analysis (Cronbach's α) was run to ensure the deletion would not have a major effect on the factor structure or internal consistency of the scale. In total, 33 items were removed from further analysis. The Cronbach's α for the remaining 92 items was 0.98, which indicates "excellent" internal consistency of the items on the scale (Hinkin, 1998; Nunnally & Bernstein, 1994).

The 5-Factor Solution Following item removal, a 5-factor solution maintained the most interpretable structure and clear factor loadings. Inspections of the factor solutions revealed a 5-factor solution to have the most interpretable structure and clear variable loadings. Also, the 5-factor solution was most conceptually relevant to the multi-dimensional model of enjoyment established a priori. It is important to examine the 5-factor solution with weak variables removed; an item removal procedure was implemented to improve the interpretability of the data structure. Therefore, factors that could not be interpreted meaningfully were not retained. This led to a final set of 5 factors.

The five factors were named Pleasure, Relatedness, Competence/Challenge, Improvement, and Engagement. The 5-factor solution aligns with ocular inspection of the scree plot. Together, the five factors explained 59.5% of the total variance (see Table 2).

Confirmatory Factor Analysis

To provide increased validity of the proposed model of enjoyment and confirm the 5-factor solution derived from the EFA, a confirmatory factor analysis (CFA) was used on a second large independent sample. The hypothesized 5-factor model was also be compared to alternative models using goodness-of-fit statistics. Two to three fit indices along with chi-squared were used to determine the overall model fit and compare the 5-factor model against 4-factor, 3-factor, and 1-factor models (Worthington & Whittaker, 2006). Similarly to the EFA, a goal of 600 participants was sought to ensure an adequate sample size for the analyses.

An anonymous survey link was shared on popular internet sites (e.g., Reddit.com), a crowdsourcing internet marketplace (i.e., Amazon's Mechanical Turk), and a university research participation system. All participants were offered the opportunity to be entered into the raffle to win one of ten $30 Amazon gift cards. In 25 days, a total of 1112 surveys

Table 2 5-Factor solution: summary of eigenvalues and Cronbach's alphas

Factor Number	# of Items	Eigenvalues	% of Variance	Cronbach's α
Factor 1: Pleasure	35	34.37	37.4	0.98
Factor 2: Relatedness	17	6.99	7.6	0.95
Factor 3: Competence	13	5.19	5.6	0.92
Factor 4: Challenge/Improvement	14	3.69	3.7	0.92
Factor 5: Engagement	13	2.63	2.9	0.90

Note: Eigenvalues were based on the Promax Rotation (Kapp = 4)

were collected. Scale items were presented in random order to participants in this administration.

Responses were removed for the same reasons listed in the EFA study (e.g., incomplete, failed validation questions, biased responses). Additionally, to ensure an independent sample was collected for the CFA, any surveys identified to be from the same person who participated in the EFA study were also removed.

After the data was screen and cleaned, a total of 668 responses remained for the analysis.

The final data set was based on a sample of people, between 18 to 73 years of age ($M = 34.76$, $SD = 11.64$). Approximately 68% were females, 69% White, and 91% had at least some college.

experience. Table 3 provides a summary of the participants' demographics.

In CFA, out of the 668 activities participants evaluated, 365 (54.6%) were unique, and most of the activities evaluated were classified as either Entertainment (26.5%), Exercise (20.7%), or Jobs (12.7%).

At the end of the survey, each participant was asked to rate their level of.

enjoyment with the activity on a 1–10 slider. Most of the activities evaluated in the CFA study.

were rated as slightly more enjoyable (M = 7.83, SD = 2.17), than in the EFA study. Overall,

Table 3 Demographics of participants in the CFA study

Variable	Value
Total (N)	668
Mean Age in years (SD)	34.76 (11.64)
Gender	
Male	212 (31.7%)
Female	451 (67.5%)
Other	5 (0.7%)
Ethnicity	
White (not of Hispanic origin)	459 (68.7%)
Black or African American	57 (8.5%)
American Indian or Alaska Native	7 (1.0%)
Hispanic/Latino	41 (6.1%)
Asian or Pacific Islander	80 (12.0%)
Other	17 (1.0%)
I do not wish to answer	7 (1.0%)
Education Level	
Less than high school	7 (1.0%)
High school graduate or GED	56 (8.4%)
Some college	200(29.9%)
College Graduate (2- and 4-year degree)	293 (43.9%)
Post-graduate degree (MA, PhD, Law, Medical, or Professional school)	112 (16.8%)

participants again tended to evaluate activities they "Liked" rather than "Disliked".

Confirmatory Factor Results

Model Fit Assessment To evaluate model fit, researchers recommend using two to three fit indices alongside the chi-square test statistic (Hu & Bentler, 1999; Worthington & Whittaker, 2006). Given this, we believe that it is important to assess both sample size adequacy and potential strength of the models external validity. This leads us to a final set of 5 fit indices alongside chi-square that were used, including the root mean square error of approximation (RMSEA; Steiger, 1980), standardized root mean square residual (SRMR), Hoelter's Critical N (CN; Hoelter, 1983), the comparative fit index (CFI; Bentler, 1990).

RMSEA assesses how well the model fits the population covariance matrix and takes sample size and model complexity into account. A RMSEA value less than 0.06 indicate excellent fit, while values between 0.06 and 0.08 indicate adequate fit (Browne & Cudeck, 1993; Fabrigar et al., 1999). SRMR measures discrepancies between covariance matrices of the data and model. A SRMR value of less than 0.10 indicates adequate fit, with 0.08 or below indicating good model fit (Hu & Bentler, 1999). Lastly, Hoelter's CN considers the study's sample size and reports the largest sample size to yield a non-significant chi-square value. A CN value over 200 signifies the sample size and model fit are adequate, while values below 75 signify unacceptable model fit and sample size (Byrne, 2016; Kenny, 2014). Another goodness-of-fit index frequently used to determine overall model fit is the Comparative Fit Index (CFI; Bentler, 1990). A CFI value above 0.95 indicates good fit and 0.90 to 0.95 may be indicative of acceptable model fit (Bentler, 1990; Hu & Bentler, 1999).

Hypothesized 5-Factor Model Fit Assessment Based on the EFA study the 5-factor full and short form solution were used in this study as the hypothesized full and short model, respectively. The full model consisted of the unobserved latent factors of: Pleasure (35 items), Relatedness (17 items), Competence (13 items), Improvement (14 items), and Engagement (13 items). In a CFA study, each item is considered an observed or measured variable. All of the latent factors were allowed to covary with each other. Results revealed that the hypothesized 5-factor model had an overall adequate fit with the new data sample. The chi-squared statistics, $\chi^2(4048, N = 668) = 14{,}887.11$, $p < 0.001$, was significant due to the large sample size (N = 668) and non-normal data. The CFI value (0.78) was very low due to the small RMSEA value (0.132) of the null model. The three primary goodness-of-fit indices (i.e., RMSEA, SRMR, and Hoelter's CN) suggest good to adequate fit between the

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5-factor model and the observed data. The SRMR indicated good fit and the RMSEA indicated adequate fit. Hoelter's 0.05 and 0.01 CN values for the full model were below the 200 indicator of a good model, 190 and 193 respectively. Table 4 provides the values of all the fit indices for the hypothesized 5-factor model. Overall it was determined the full model has adequate fit.

The short form of the 5-factor scale was created by taking the 5 psychometrically best items on each factor with each item having a factor loading of 0.83 or above per criteria recommended by DeVellis (2016). The resulting 25 item short form of the scale had an overall alpha of 0.91 and the 5 factors explained 64% of the total variance.

Model Comparisons The hypothesized 5-factor model was compared against five alternative models in terms of overall model fit. All of the models have the same number of cases (N = 771) and observed variables (N = 92) except the short model, which had a reduced number of variables (N = 25). The first alternative model was the same 5-factor structure, except the factors in the model were not allowed to covary with one another. Second, the short model had a reduced number of items (N = 25). Next, the 4- and 3- factor models were suggested as possible factor solutions based on the results from the EFA study aside from the 5-factor solution. The 4-factor solution combined Competence and Challenge/Improvement factors into a single factor. The 3- factor solution combined Competence, Challenge/Improvement, and Engagement into one factor. Both the 3- and 4- factor models were allowed to covary with each other. Last, a 1-factor model hypothesized that all observed variables loaded on the same factor.

The large sample size and small RMSEA value of the null model resulted in statistically.

significant chi-square and substandard CFI values across the uncorrelated 5-factor, 1-, 3-, and 4-

factor models. The short form 5-factor model had a RMSEA value of the null model (0.218) above the 0.158 cut-off. The CFI for the short form was 0.94 which is considered indicative of acceptable model fit (see Table 5). In terms of the main fit statistics used to compare model fit in this study, the 4-. 3-, and 1- factor models had poor fit with at least two of the main fit indices. The short form 5-factor model had improved fit indices compared to the hypothesized 5-factor full model. The short form model had the lowest RMSEA and SRMR values, and highest Hoelter's CN and CFI.

Lastly, the chi-squared difference tests conducted resulted in statistically significant results between the hypothesized 5-factor model and the 5- (uncorrelated) 4-, 3-, and 1- factor models. This indicated that the hypothesized 5-factor model has a significantly better fit in comparison to these four alternative models. However, the short form model also had a statistically significant result between itself and the hypothesized 5-factor full model. This means that while the 5-factor model was significantly better than the alternative models, the short form version was significant better fit in comparison to the full model. Overall, results from the goodness-of-fit statistics suggested that the short 5-factor solution is the most appropriate model. Table 6 presents the results of all main fit statistics across different models.

Scale Reliability and Validity Assessment In the CFA, the last step is to re-examine the reliability of the scale and assess the convergent and discriminant validity of the scale (Cabrera-Nguyen, 2010). First, the internal consistency of the 5-factor short solution was compared across.

Table 4 Hypothesized 5-factor model's fit statistics (N = 668)

	Value
Fit Index	Full
χ^2	(4048) = 14,887.11, p < 0.001
CFI	0.78
RMSEA (90% CI)	0.063 (0.062, 0.64)
SRMR	0.08
Hoelter's CN (0.05, 0.01)	190, 193

Chi-squared statistics and CFI were not used in overall assessment of model fit due to large sample size (N = 668) and the null model's RMSEA being below 0.158. SRMR and Hoelter's CN, are adequate

Table 5 Chi-square and CFI fit indices across models (N = 668)

Model	χ^2	CFI/AIC/BIC
5 factors (correlated)	χ^2(4048, N = 668) = 14,887.11, p < 0.001	0.78
5 factors (uncorrelated)	χ^2(4094, N = 668) = 15,951.90, p < 0.001	0.76
5 factors (short)	χ^2(265, N = 668) = 911.87, p < 0.001	0.94/1006.8/1010.7
4 factors (combined C and CI)*	χ^2(4089, N = 668) = 16,725.49, p < 0.001	0.74/2055.6/2059.3
3 factors (combined C, CI, and E)*	χ^2(4092, N = 668) = 18,724.79, p < 0.001	0.70/3629.1/3632.7
1 factor	χ^2(4094, N = 668) = 25,271.37, p < 0.001	0.57/5595.9/5600.4

Chi-squared statistics and CFI were not used in overall assessment of model fit due to large sample size (N = 668) and the null model's RMSEA being below 0.158 for all models except short. *C = Competence, CI = Challenge/Improvement, and E = Engagement

Table 6 Summary of fit statistics

Model	RMSEA (90% CI)	SRMR	Hoelter's 0.05; 0.01	$\Delta\chi^2$	$\Delta\chi^2$ (Short Model)
5 factors (correlated)	0.063 (0.062, 0.64)	0.08	190; 193	N/A	$\Delta\chi^2(3829) = 139{,}745.24$, $p < 0.001$
5 factors (uncorrelated)	0.066 (0.065, 0.067)	0.25	178, 181	$\Delta\chi^2(46) = 1064.79$, $p < 0.001$	-
5 factors (short)	0.060 (0.056, 0.065)	0.06	223; 236	-	N/A
4 factors (combined C and CI)*	0.068 (0.067, 0.069)	0.09	170; 172	$\Delta\chi^2(41) = 1838.38$, $p < 0.001$	-
3 factors (combined C, CI, and E)*	0.073 (0.072, 0.074)	0.09	152; 154	$\Delta\chi^2(44) = 3837.68$, $p < 0.001$	-
1 factor	0.088 (0.087, 0.089)	0.11	113; 114	$\Delta\chi^2(46) = 10{,}384.26$, $p < 0.001$	-

Table 7 Cronbach's alphas across EFA (N = 798) and CFA (N = 668) studies

Factor	EFA Study Cronbach's α	CFA Study Cronbach's α
Factor 1: Pleasure	0.95	0.94
Factor 2: Relatedness	0.92	0.90
Factor 3: Competence	0.87	0.87
Factor 4: Challenge/Improvement	0.86	0.87
Factor 5: Engagement	0.85	0.88
Entire Scale	0.90	0.90

the EFA and CFA studies. Cronbach's alpha was calculated for each factor and the overall scale from each sample (see Table 8). Cronbach's alpha above 0.70 is acceptable, 0.80 good, and 0.90 excellent (DeVellis, 2016; Hinkin et al., 1997; Nunnally & Bernstein, 1994). See Table 7.

Results show the internal consistency of the scale showed stability across the EFA and CFA studies. The largest fluctuation of Cronbach's alpha was 0.03 and all of the factors remained in the good to excellent range for the EFA and CFA studies. The overall Cronbach's alpha did not change between the EFA and CFA studies, remaining in the excellent range. Lastly, the relationship between overall enjoyment and each of the factors was fairly stable across both studies, with all relationships resulting in statistically significant Pearson's correlation coefficients ($p < 0.01$).

Next, standardized factor loadings were examined to investigate convergent validity. Researchers identify factor loadings below 0.40 as weak and those above 0.70 as strong (Cabrera-Nguyen, 2010). All of the factor loadings were above 0.40, with all but 4 loadings above 0.70. Then, correlations among the factors in the CFA study were examined to assess the discriminantvalidity of the scale. Researchers recommend that factor correlations be below 0.80or 0.85 to ensure good discriminant validity (Brown, 2014; Cabrera-Nguyen, 2010; Kline, 2005). All of the factors were below the 0.80 recommendation, the two strongest factor correlations were between Pleasure and Challenge/Improvement ($r = 0.46$); and Pleasure and Competence ($r = 0.45$).

Lastly, to further establish convergent and discriminant validity, as well as reliability of the scale, the Composite Reliability (CR), Average Variance Extracted (AVE), and Maximum Shared Variance (MSV) were also calculated (Hair, et al., 1998). Composite Reliability (CR) estimates the extent to which a set of latent construct indicators share in their measurement of a construct, with values > 0.7 indicating good reliability. Average Variance Extracted (AVE) is a measure of the amount of variance that is captured by a construct in relation to the amount of variance due to measurement error, with values > 0.5 indicating good convergent validity. For Maximum Shared Variance (MSV) values below the AVE indicate good discriminant validity. All of the factors had CR values above 0.7, AVE values above 0.5 and MSV values were below AVE values. Additionally, a factor correlation matrix with the square root of the AVE on the diagonal is used to further establish discriminant validity, where values greater than inter-construct correlations indicate good discriminant validity. All of the values along the diagonal were greater than the inter-construct correlations. Altogether, results demonstrate that the 5-factor solution has good convergent and discriminant validity. The short form of the ENJOY is contained in Appendix. The long form of the scale may be obtained for use at: https://daytonabeach.erau.edu/about/labs/game-based-education-and-advanced-research.

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Discussion

To develop a more thorough understanding of enjoyment, this research created a psychometrically-sound survey measure of enjoyment based on previous research.. The resulting survey included five factors of enjoyment: pleasure, engagement, competence, challenge/improvement, and relatedness. See Appendix for the 25 item version of the scale and instructions for administration. In this section, the overall findings and limitations of the study are discussed. Last, directions for future research are posed and potential avenues for using the new ENJOY scale are suggested.

The ENJOY Scale

The results of this study presented a scale for the measurement of enjoyment. The way in which SDT (Ryan & Deci, 2001, 2002, 2000) conceptualizes enjoyment is particularly relevant to this study. First, the subscales contained in the scale are closely aligned with the three basic psychological needs in SDT, as well as the correlates of the state of intrinsic motivation. Just as the tenets of SDT are universal, the enjoyment derived from psychological need satisfaction and engagement in activities that are intrinsically motived wouls also be universal. Thus the ENJOY scale provides a general measure of several facets of enjoyment that should be able to be utilized across cultures. With its alignment to SDT concepts, it would also seem to be consistent with the conceptualization of enjoyment in the positive psychology movement.

The ENJOY scale also presents a standardized measurement of the construct that can be administered and used to evaluate enjoyment across any activity. The ENJOY scale was developed and validated based on the assessment of over 600 unique activities across a wide range of categories. As discussed in the literature review, measurement of enjoyment previously was piecemeal and varied across domains. Development of the ENJOY as a genral, non-domain specific measure will allow greater comparisons of results across studies and across domains where enjoyment is an outcome measure. Additionally, the ENJOY scale was developed with simple language and readability analysis found it to be standard in readability at Grade 5 level (Readabilityformulas.com, 2019). The results provide confidence that the ENJOY scale is a reliable and valid measure of a multi-dimensional view of enjoyment. Last, the final version of the ENJOY scale is not lengthy, consisting of only 25 items across the 5 subscales. The entire scale takes between 3–5 min to complete.

Limitations. The ENJOY scale has just been developed and psychometrically validated. Thus, there is no information yet on construct validity for the scale across different activities, in relationship to other measures of enjoyment, or other concepts related to SDT. Future research in various domains will be needed to provide greater construct validity for the scale. In addition, the ENJOY scale may be criticized for its seeming overlap with constructs related to basic psychological needs and intrinsic motivation (Ryan & Deci, 2002). This is a legitimate concern and requires further discussion. For instance, the ENJOY contains subscales measuring the enjoyment associated with competence, and competence is also a basic psychological need. While the instructions for administration are very clear in that the respondents report their perceptions post-activity, as an outcome of participation, there may still be some overlap in motivational needs that initiate activity and the enjoyment expressed post-activity. What is needed to further delineate the ENJOY scale from pre-activity motivation is a study examining both, to determine how motivation that initiates an activity, correlates with the type of enjoyment derviced from the activity. It is not hard to conceptualize the temporal differences between pre-activity motivation and what is measured by the ENJOY, however empirical research will be needed to support htose differences.

In summary, the ENJOY was used to measure activity outcomes and was based on past conceptualizations of enjoyment. From a scale development perspective it has been shown to be valid. However, theoretical overlap with motivational constructs is present. It may be that enjoyment and intrinsic motivation overlap significantly and exist together, however the scale may still provide a useful outcome measure addressing elements of both.

Defining Enjoyment

An important consequence of the present study was that it also allowed for the development of a new definition of enjoyment based on empirical evidence. This new definition, aiming for simplicity and brevity, is as follows:

> A positive feeling, when engaged in a pleasurable and challenging activity, which allows for skill improvement, makes you feel connected to others, and makes you feel proficient with the activity.

This is a more complete definition of enjoyment based on the multi-dimensionality found during the scale development process. However, the definition could be put even more simply based on the amount of variance explained by each factor to:

> A positive feeling, when engaged in a pleasurable activity.

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While this shortened definition does only identify two out of the five factors of enjoyment within the definition (engagement and pleasure), it is very clear and easy to understand. While the longer definition is recommended for academic research, the shorter simpler definition can be used when the primary concern is brevity rather than accuracy or when only the subscales of pleasure and engagement are of interest.

Future Research

This study described the creation and validation of a measure of enjoyment applicable across any activity. There are now many avenues researchers can pursue to further validate and extend the applicability of the ENJOY scale. While the present study examined the scale's reliability, content, and construct validity, it is still in need of additional validation. In particular, future studies need to assess the construct-related validity of the ENJOY scale by comparing the scores obtained from the ENJOY scale with variables that should be related to enjoyment such as: participation motivation, intent to recommend participation in an activity, desire to engage in the activity again, or self-reported perceptions of energy resulting from enjoyment.

While the ENJOY scale was designed at a 5^{th} – 7^{th} grade reading level, it was only tested in populations of 18 years of age or older. If researchers are interested in administering the ENJOY scale to younger populations, the ENJOY scale must be evaluated in those populations. Theoretically, the ENJOY should also be useful in measuring enjoyment across cultures, however translations of the scale into other languages will need to be done with validity and reliability testing. Additionally, most of the activities evaluated in this research were activities respondents generally liked rather than disliked. Thus, it is not known how much the scale will be applicable to every activity, especially those that are disliked. While the scale was validated with over 600 unique activities reported, new activities evaluated can assess the true universality of the scale. Also, much more work needs to be done to determine a standard scoring for activities from each category.

Conclusion

The present study provides a clear definition and tool to evaluate enjoyment across domains. The ENJOY scale was developed based on best practices in scale development and validation. The ENJOY scale was administered to two large, independent samples of over 600 respondents and over 600 unique activities. The ENJOY scale contains 25 items with 5 subscales and takes, on average, 3–5 min to complete. It was found to be reliable across two samples and demonstrated content and dsicriminant validity. The model remains open for empirical testing, and further model validation would be useful in extending knowledge of how enjoyment occurs across activities, domains, cultures and age groups.

Appendix

AQ7

The ENJOY Scale

Scoring Guidelines

The ENJOY scale is based on a seven-point Likert scale with a response anchor at every rating point (e.g., 1 = Strongly Disagree, 5 = Somewhat Agree, 7 = Strongly Agree). The order of statements can be presented as is or randomized per respondent. For online questionnaires, it is recommended that the statements on the scale be separated into 5–7 statements per page to minimize scrolling. "The activity" can be replaced by a specified activity or left blank for respondents to fill.

The ratings (from 1–7) of all items on the same dimension should be averaged to obtain subscale scores for each respondent. The composite score of enjoyment can be obtained by summing the averages of each subscale together. For the composite score, the minimum value is 5 and the maximum value is 35. Alternatively, an average score of all items can be used as an overall score of enjoyment.

Scoring Guidelines per Dimension/Subscale

Pleasure (5 items)

2. The activity was pleasurable to me
5. The activity made me feel happy
9. The activity was fun
17. I liked doing the activity
25. The activity made me feel good

Relatedness (5 items)

4. I felt connected with others during the activity
8. I liked interacting with others during the activity
16. I cooperated with others during the activity
19. The activity was a shared effort with others
21. I felt close to others when I did the activity

Competence (5 items)

6. I felt very capable during the activity
11. I am good at the activity
22. I felt like I did a good job the last time I did the activity
23. I was proficient in the activity
24. I felt competent at performing the activity

Challenge/Improvement (5 items)

1. The activity allowed me to develop new skills

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7. I felt challenged, but not over-challenged, during the activity

10. I improved my skills the last time I did the activity

15. During the activity I could get better at doing it

18. I felt challenged, but not under-challenged, during the activity

Engagement (5 items)

3. I lost track of what was going on outside of the activity

12. I forgot what was going on around me during the activity

13. I lost track of time during the activity

14. When I did the activity, I thought about nothing else

20. I lost track of what was going on around me during the activity

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Data availability Data and materials are available upon request from the first author.

Declarations

Conflicts of Interest/Competing Interests There are no conflicts of interest or competing interests for any of the study's authors.

Ethics Approval This study was approved by the IRB at Embry-Riddle Aeronautical University, #18–052.

Consent to Participate A consent form was completed by all participants, as required and approved by the IRB project #18–052.

Consent to Publish All authors provided consent for publication. This work has not been published elsewhere in part or whole.

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